EDUCATION, to understand the principles
ATTITUDE, to set the targets
HARD WORK, to achieve them

January-December 2014 nr. 9

CEI UPM newsletter

CENTRO DE ELECTRÓNICA INDUSTRIAL

Cooperation models between Industry and Academia have been discussed for ages. Most of the times, the funding mechanisms are the core of the programs, especially in public funded programs. However, industry-academia cooperation is broader than just an amount of money to facilitate the cooperation. How the research topics are selected, and appropriate follow-up of the specific projects to deploy the results of the activity are of crucial importance. Recently, the President of SEAT was asked about the difference between Germany and Spain regarding Research, Development and Innovation. His answer was at the same time broad and compact: "Synchronization between Industry and University is the key". Any initiative helping to "synchronize" should be welcome. Far beyond the money.

*This Newsletter has shown to be effective to connect with you. You get acquainted of CEI activities: our publications, the workshops and conferences we organize, our research meetings, our current and new research projects, and most important, the Master Thesis and Doctoral Dissertations of our students. The CEI Annual Meeting (**April 16th and 17th in 2015**) is also extremely effective to sync with you. You bring your light & vision to CEI while you learn in lively discussions what we do, and this is an excellent way to envisage a joint research.*

*One additional step forward is the creation of the "**Industrial Council at CEI**", in which Industry influences the Education program and the Research Strategy at CEI. Moreover, students and industry become strongly connected. The first results of Bologna declaration are here. Around 20-30 undergraduate students, every year, will develop a short (12 ECTS) research work at CEI in the 4th year of their engineering education. This is an opportunity for Industry to interact with them. One more opportunity is our **Master on "Industrial Electronics",** because we are incorporating a new "Professional track", in addition to the well-established "Research track" oriented to Doctorate. We want Industry to influence our research and our students, and vice versa. We believe the "Industrial Council at CEI" will be a strong step forward. Help us to define and implement it!*

We want to be in sync with you, student, researcher, engineer, manager, or just a person who believes electronics, energy efficiency, digital systems, embedded intelligence, sensor networks, reconfigurable hardware or RF communications are challenging.

*"**A senseable world**" is the keynote for our coming Annual Meeting, April 9th and 10th. Do not miss it!!*

The editorial board

2014 Events at CEI

MARCH 27 28 — 7TH CEI-UPM Annual Meeting

On March 27th and 28th, 2014 we celebrated the **7th Annual Meeting** of the CEI-UPM at the ETSII-UPM. The Opening Session, devoted to Smart Grids, was the starting point of a variety of special events, lectures, and exhibitions .

March 27th, in the afternoon

In this Edition, the opening ceremony was led by the ViceDean of research from the Universidad Politécnica de Madrid, Prof. R. Prieto, and the Director of CEI, Prof. José A. Cobos. An overview of the history of CEI and the motivation to organize the annual meeting was given. We had relevant speakers coming from industry and universities whose talks showed different points of view regarding Smart Grids.

Finally, the traditional Poster Session was held in our lab. CEI young researches had the opportunity to show their research work and to discuss about their latest outcome.

March 28th, in the morning

Friday technical sessions were structured in three parts: CEI, University and Industry sessions. For the CEI oral sessions, some of the key contributions of our Center were selected, covering several topics of our research lines.

Social event

Finally, closing that 7th Annual meeting, a relaxing cocktail was a very nice chance to discuss and to share opinions while enjoying and tasting some appetizers and, surely, to wish a very warm "see you next year" at the 8th CEI Annual Meeting

For all of us at CEI, it was an excellent opportunity to bring together faculty, staff, students and enterprise representatives to celebrate our joint R+D+I interests, current and future cooperation and challenges.

OCT 8 10 — DASIP

The **8th annual Conference on Design and Architectures for Signal and Image Processing (DASIP)** has been organized in Madrid, Spain and included keynote speeches, contributed paper sessions, poster sessions, special sessions on timely topics, as well as a demo night.

Eduardo de la Torre, who leads the Reconfigurable Systems research line at CEI, and Sebastien Pillement, from Polytech University of Nantes, (France) were the General Co-Chairs of the Conference. Program Co-Chairs were Joao Cardoso (University of Porto, Portugal), and Marek Gorgon (AGH Univ. of Science and Technology in Cracow, Poland).

DASIP addresses the development of complex applications involving signal, image and control processing based on a new approach called Algorithm-Architecture-Matching, which aims to leverage the design flow by a simultaneous study of both algorithmic and architectural issues, taking into account multiple design constraints, as well as algorithm and architecture optimizations.

The goal of DASIP is to present the latest results in the domain of design and architecture for signal and image processing along several axes: methods and tools; development platforms, architectures and technologies; use-cases and applications as well as smart sensing systems.

Next year DASIP Conference will be held in Cracow, Poland

Annual Meeting 2015

April 16 & 17

Take note in your agenda!!

The 8th Annual Meeting of the CEI-UPM will take place in the ETSII-UPM on **April 16th and 17th, 2015.**

As in previous editions, the main objective is to present the activities at CEI and its partners. The Annual Meeting is an interesting networking space, a place to learn and to meet your colleagues and partners.

THURSDAY MORNING (April 16th) — New!!

This year, we include in the program 2 short-courses:

- "Digital Control of Power Electronics Converters"
- "Reconfigurable Systems and Evolvable Hardware"

THURSDAY AFTERNOON (April 16th)

Opening session
Overview of CEI R&D activities
Strategic Research

Keynote
A Senseable world

CEI Lab tour and POSTER SESSION

FRIDAY MORNING (April 17th)

Technical Sessions
CEI, University and Industry Sessions

Wrap-up Cocktail

NOV 26 28 — DCIS

The **29th edition of DCIS Conference (Design of Circuits and Integrated Circuits)** took place at ETSII-UPM last November, organized by CEI-UPM. 120 researchers from academia and industry met together in a friendly conference. This year, DCIS is technically sponsored by IEEE – CAS (Circuits and Systems Society) and the papers will be available through the IEEExplore digital library. Besides, seven tutorials were embedded in the conference addressing new topics in electronic design. Two keynote speeches (*Putting Computing on a Strict Diet with Energy-Proportionality*, by Alex Yakovlev, and *From Evolvable Hardware to Approximate Computing*, by Lukáš Sekanina), one panel session (*Quo Vadis Zero Power Design: A System-Driven Debate*, organised by Antonio Rubio), complemented the 25 technical sessions where the regular papers were presented. The conference was complemented with a social program where the participants could visit the newest trends in Medialab Prado, tasting beers brewed in Madrid, and one the most classical private collections of the city in Museo Lázaro Galdiano, followed by a gala dinner at Pedro Larumbe.

We look forward to meeting you all next year at DCIS'2015 in Cascais (Portugal) (www.dcis.org)

by Y. TORROJA

Open Source Hardware in Business, Research and Education

This year is the tenth anniversary of the launch of the Arduino platform, the first Open Source Hardware (OSHW) platform with strong impact. Created in 2005 by Massimo Banzi as a tool for his students at the Interaction Design Institute Ivrea, Arduino has become one of the most used platforms of DIY electronics, and certainly the flagships of OSHW movement.

The Arduino platform consists of a small PCB with a low-performance microcontroller that can be very easily programmed. The system is designed to work with sensors and actuators, and to provide a cheap interface between the physical world and other digital devices.

The most interesting thing about this platform is not the circuitry itself, or its endless possibilities, but the underlying philosophy that has made it a success. Its low cost (less than 30$), ease of use, and the fact of being Open Source (hardware schematics, layout and software are available for free under public license), have made it the most commonly used platform for hardware prototyping, as well as one of the highest penetration in STEM education (Science, Technology, Engineering and Mathematics). In fact, the Arduino platform is used from schools to universities, or even research centers. It is programmed by users with very different skills, from artists, or kids, to experts in electronics, and it is used in many different fields, from DIY projects to interactive installation artwork or commercial products. Many clones, derivatives and additional hardware have been born from it, and many entrepreneurs are working with the same OSHW philosophy and business model.

There are some interesting conclusions that can be drawn from the success of this platform. First, OSHW is a viable business model that is quickly taking off (some forecasts estimate a market at around $1B by 2015, when in 2013 hovered just $50M). Second, price has been a key factor in the Arduino success. Although there were similar products (like Parallax BASIC Stamp), never before a platform with these capabilities was accessible at such a low cost. Part of this low cost is a consequence of being OSHW. Last, but not least, simplicity on procedures and methodologies is a marketable value, as important as the technology itself. As engineers or researchers we are used to work with complex processes, and very often we underestimate the difficulty in transmitting this knowledge, both to our students and to other engineers or researchers that must continue our work. Experience with OSHW, whose community has a strong tradition in simplifying and documenting their work as a way to promote it, shows that this effort can produce great profits.

Monday Seminars 2014

FEB
- 17 "Output Impedance Correction Circuit (OICC)" by **V. Šviković**

MAR
- 10 "HiReCookie . Node Architecture for Dynamically Trading-Off Among Performance, Power Consumption and Dependability in Cyber Physical Systems" by **J. Valverde**
- 17 "Envelope amplifier based on multiphase buck converter with MTC for highbandwidth application" by **P. Cheng**
- 24 "Hardware implementation of Artificial Neural Network for image encoding" by **D. Aledo**
- 31 "Towards Improved Fault Tolerance by means of Dynamic and Partial Reconfiguration in Space Applications" by **F. Veljković**

MAY
- 5 "Towards Automated Development Of Evolvable Hardware Applications: Architectures And Tools" by **J. Mora**
- 19 "Comparative analysis of three-phase active rectifier solutions for More Electric Aircraft" by **U. Borovic**

JUNE
- 2 "Towards an Adaptive and Cooperative Learning Model" by **M. Villaverde**
- 16 "DC/DC converter solutions for More Electric Aircraft" by **Y. Bouvier**
- 30 "Isolated Swiss-Forward Three-Phase Rectifier with Resonant Reset for Aircraft Applications" by **M. Silva**

SEPT
- 15 "v1 concept" by **J. Cortés**

OCT
- 13 "Resonant Dual Active Bridge for Smart Grid Applications" by **J.M. Molina**
- 27 "Dynamic Hardware Resource Management in Reconfigurable Computing" by **A. Rodríguez**

NOV
- 3 "Output Impedance Correction Circuit (OICC)" by **V. Svikovic**
- 17 "Precise models for characterization and losses estimation in magnetics components" by **F. Holguín**
- 24 "Madrid Rectifier" by **S. Zhao**

DEC
- 1 "Towards an Adaptive Hardware Parallel Particle Filter" by **D. Pérez**
- 15 "DC-nanogrid-architectures" by **A. Francés**

2015

JAN
- 12 "Design and Development of a HW/SW-based Commissioning Toolset for Deploying, Debugging and Optimizing Wireless Sensor Networks" by **G. Mujica**
- 26 "FPGA-based Architecture for High Performance Autonomous Systems with Limited Resources" by **J. Valverde**

FEB
- 2 "Hardware implementation of Artificial Neural Networks for WSN" by **D. Aledo**
- 16 "Physical Model of a GaN HEMT with a Field Plate structure and general directions for design optimization in a High Frequency DC-DC converter" by **D. Čučak**
- 23 "More CARE II: Three-Phase Buck Rectifier for More Electric Aircraft" by **R. Ramos**

Master Theses

11/03/2014

CPU/GPGPU/HW comparison of an Eigenfaces face recognition system
Author: **Julio Camarero** **Supervisor**: E. de la Torre

Dynamically Scalable Evolvable Hardware Processing Array
Author: Ángel Gallego **Supervisor**: E. de la Torre

Author: Carlos A. López **Supervisor**: J.A. Oliver

Sistema de inteligencia embebida con autoaprendizaje basado en una arquitectura de árbol de decisión dinámico y adaptativo
Author: David P. Daza **Supervisor**: F. Moreno

Hardware-Based Particle Filter with Evolutionary Resampling Stage
Author: Alfonso Rodríguez **Supervisor**: F. Moreno

Modelo de aprendizaje cooperativo basado en arquitectura multiagente para sistemas con inteligencia embebida
Author: Mónica Villaverde **Supervisor**: F. Moreno

14/07/2014

A Low-Cost Piezoelectric Human Energy Harvester for Smart Cities and Wireless Sensor Networks
Author: David Butkiewicus **Supervisors**: T. Riesgo & P. Alou

01/10/2014

Analysis and Comparison of Different Active Rectifier Topologies for Avionic Specifications
Author: Uros Borović **Supervisors**: P. Alou & J.A. Oliver

Optimization of Full Bridge topology with triangular current for avionic applications
Author: Yann Bouvier **Supervisors**: P. Alou & M. Vasic

Optimization of inductive resonant coupling links for low power and mid-range wireless power transfer
Author: Alejandro Llop **Supervisor**: J.A. Oliver

Desarrollo de un controlador de presión de combustible basado en bombas trifásicas sin escobillas
Author: Alejandro Moscat **Supervisor**: O. García Suárez

PhD Theses

16/01/2014
Run-Time Scalable Hardware for Reconfigurable Systems
by **Andrés Otero**
Supervisor: Eduardo de la Torre

07/03/2014
A Novel Methodology For Planning Reliable Wireless Sensor Networks by **Danping He**
Supervisors: Teresa Riesgo & Jorge Portilla

22/04/2014
Side-Channel Attack Protection Techniques In Fpga Y Systems Using Enhanced Dual-Rail Solutions by **Wei He**
Supervisor: Eduardo de la Torre

23/07/2014
High Efficiency Envelope Amplifier based on a Ripple Cancellation Buck Converter. Desig, Optimizatin and Integration in an EER RFPA by **Daniel Díaz**
Supervisors: Óscar García Suárez & Jesús A. Oliver

28/07/2014
Wide bandwidth eveelope trackers with reduced switching frequency for RF power amplifier by **Pengming Cheng**
Supervisor: Óscar García Suárez & Miroslav Vasić

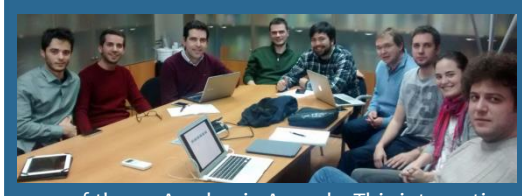
17/10/2014
Modelling and control of stepper motors for high accuracy positioning systems used in radioactive environments by **Ricardo Picatoste**
Supervisors: Jesús A. Oliver & Alessandro Massi

NEWS BRIEFS

CONGRATULATIONS

A **general award for the research work and special award granted** by ONCE Foundation which aims to reward the best research in the field of improving the quality of life of people with disabilities, "Modelo de aprendizaje cooperativo basado en arquitectura multi-agente para sistemas con inteligencia embebida" by **Mónica Villaverde & David P. Daza,** XIII Certamen A Arquímedes de Introducción a la Investigación Científica (Mº de Educación, Cultura y Deportes), Novembrer.

Blanca López, was received the **Best Student of the Industrial Engineering** degree (Automatic & Electronics) and received **Best Engineering Degree Final Project Awards** by the F212 Foundation, Academic year 2013-2014



The **CEI team** participating in the **Google Little Box Challenge** has been awarded one of the 10 Academic Awards. This international competition, in which more than 650 teams from around the world participate, has a prize of one million dollars for the team to build the smaller inverter for solar PV panels.

Award for one of the best ideas for bussiness in the actua-UPM competition to **José M. Molina**

Dr. Óscar García, in his new position as **Vicedean for Research, Doctoral Studies and Relations with Companies of the ETSII** since May 2014

current research projects

Modeling & Simulation of power architectures, circuits and components

- ANSYS *PExprt-SMPS: PExprt and SMPS Library funded by ANSYS, 1/5/2007 to 1/5/2017*

Optimization of Power Architectures

- XFEL: *Fuentes de alimentación para los imanes superconductores del XFEL europeo* funded by **M° Ciencia e Innovación,** 1/12/2010 to 30/11/2013
- indra *MORE-CARE: Modelado y optimización del rectificador para la cadena de alimentación del radar electrónico* funded by ***INDRA***, 1/1/2013 to 28/2/2015
- APEX *APEX: Agassiz Peak Research Project* funded by **APEX Microtechnology**, 4/12/2013 to 3/8/2014.

Integrated DC/DC Converters

- *PowerSwipe: POWER SoC With Integrated PassivEs* funded by ***European Comission Frame Program 7,*** 01/10/2012 to 30/9/2015

Reconfigurable Embedded Systems

- *DREAMS: Dynamically Reconfigurable Embedded Platforms for Networked Context-Aware Multimedia Systems* funded by ***M° Ciencia e Innovación,*** *1/1/2012 to 30/6/2015*

Sensor Networks

- TECALUM: *Sistema de Iluminación Inteligente LUIX* funded by **INNPACTO. M° Ciencia e Innovación,** 1/11/2011 to 31/3/2015
- WSN DPCM: *WSN Development, Planning and Commissioning & Maintenance ToolSet* funded by **Artemis/MICyT,** 1/10/2011 to 31/3/2015

Wide Band-gap devices

- RUE: *Advanced Wide band gap semiconductor devices for rational use of energy* funded by **M° Ciencia e Innovación,** 1/11/2009 to 16/12/2015

Telecommunications consulting

- *ECOLOG. Nueva solución de pesca integral, responsable y sostenible para la mejora de la productividad y el aprovechamiento en el sector pesquero* funded by **Satlink** and **M° de Economía y Competitividad**

Industrial Applications

- *CAVE: Convertidores de Alta VElocidad de conmutación multinivel y multifase para aplicaciones espaciales* funded by **M° de Economía y Competitividad**, 1/1/2013 to 31/12/2016.
- ALSTOM *ALSTOM: Desarrollo de un circuito para desmagnetizar una máquina síncrona mediante IGBTS en paralelo* funded by **Alstom Renovables España S.L,** 1/11/2013 al 15/05/2014

More Electric Aircraft

- *AIR: Active and Isolated Rectifier unit for more electric aircraft: Design and Manufacturing of a 10kW AC-DC Converter Unit* funded by ***European Comission (Program CleanSky)***, 1/10/2013 to 30/9/2015

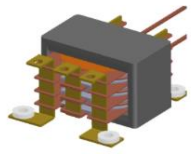
Power Quality

- ***GENINF:*** *Gestión Automatizada de los datos de registradores de REE* funded by **REE,** 11/2011 to 9/2014

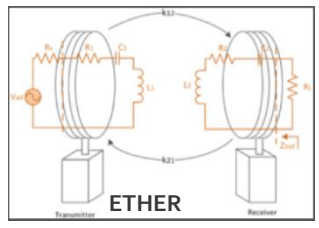
new research projects

PREMO Inductive Components

PREMO: Design of experiments based on Electromagnetic Simulation for the validation of magnetic component designs on given applications funded by **PREMO,** 1/11/2014 to 31/1/2015

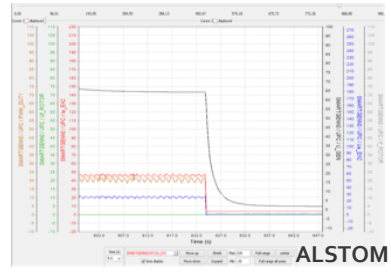


This project focus on the definition of Electromagnetic Simulation design experiments for Magnetic Components for the optimization and definition of these components in given applications. Based on the application of the magnetic component, a set of Electromagnetic Simulations design experiments will be defined that will allow the Virtula validation of the magnetic component design fot that application.



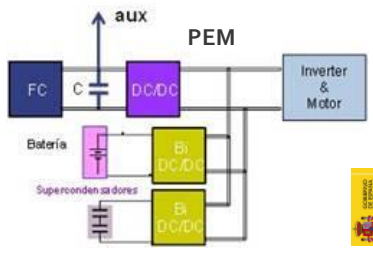
ETHER: Transferencia de Energía Inalámbrica - Sistema Completo e Impacto en la Salud funded **by M° Economía y Competitividad,** 1/1/2014 to 31/12/2016

ETHER is a research project funded by the spanish government to research in Wireless Energy Transfer. The consortium is formed by CEI and CTB (Center for Biomedical Technology) both from UPM and the Electronics Engineering Department from UPC. The main goal is to transfer energy based on magnetic (resonant inductive coupling, RIC) and electromagnetic (radio frequency, RF) fields. Besides, the impact of these fields on the human health will be evaluated.



ALSTOM *Industrialización de un circuito para desmagnetizar una máquina síncrona* funded by **ALSTOM,** 01/07/2014 to 31/12/2014

The main objective of the project is to develop a protection for a synchronous generator based on IGBT technology. The circuit is mounted ton the rotor of the generation and it is monitoring the status of the machine being able to disconnect and demagnetize it in case of short-circuits. This work is been done in collaboration together with the Grupo de Máquinas Eléctricas of this school of the UPM.

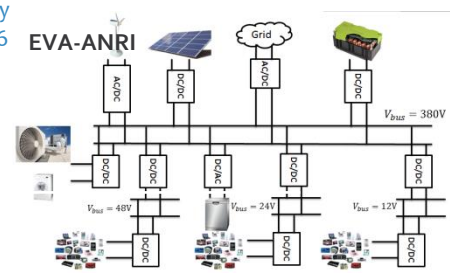


epHisa Española de Pilas de Hidrógeno, SA

PEM: Sistema de pila de combustible PEM de baja potencia en configuración híbrida con baterías para aplicación a un vehículo: sistema de control electrónico funded by **Española de pilas de hidrógeno,** 01/12/2014 to 30/11/2015

The main objective and challenge of this Project is the development of a Low power PEM fuel cell and battery hybrid system for vehicular applications. As a proof of that development a practical (Golf vehicle up to 500 W) application is considered.

EVA-ANRI: Evaluación y modelado de arquitecturas de nano-redes inteligentes en corriente continua funded by **M° Economía y Competitividad,** 01/01/2014 to 31/12/2016



ANRI (Arquitecturas de Nano-redes Inteligentes en Edificios) stands in Spanish for Arquitectures for Smart DC Nanogrids in Buildings. It is a R&D project developed in cooperation with University of Oviedo where different architectures for Smart DC Nanogrids in buildings will be studied and modelled.

The project will be focused in the development of models of the different building blocks integrated in the DC nanogrid oriented to system-level simulation, stability analysis and energy management. At the same time, some of the critical power converters included in a selected architecture will designed and optimized.

satlink

SATLINK: ***Investigación y desarrollo en tecnologías para la discriminación pesquera y el aprovechamiento sostenible del medio marino*** funded by **SATLINK,** 02/01/2014 to 31/12/2015

SATLINK: ***Investigación y desarrollo en tecnologías para la observación de actividades de buques en tiempo real*** funded by **SATLINK,** 02/01/2014 to 31/12/2015

Google Little Box Challenge. This new project targets the development of a 2kVA inverter, supplied from 400VDC generated by solar PV panels or batteries.The winner will be the smaller inverter complying with all the electrical, mechanical and thermal specifications.The 4 technical challenges pointed out by Google are a) the necessity to Store Energy at rectified line frequency (100Hz). PV panels deliver constant power (2kW) to the inverter, which delivers pulsating power (0 – 4kW) to the AC load. b) miniaturization ofcomponents by high frequency and high efficiency power conversion, (hundreds of kHz); c) compliance with EMI regulations and d) thermal management, so that the temperature in the box of the inverter is below 60°C under any operating condition.

LiTTLE BOX CHALLENGE

CONGRATULATIONS


F. Moreno


J. Portilla

- **Dr. Jorge Portilla,** Secretary of the CEI since April and "Profesor Contratado Doctor "in September .
- **Dr. Félix Moreno,** in his new positiion CEI Vicedirector since April.

BEST PAPERS AWARDS

- **Outstanding paper presented,** *Impact of the control on the size of the output capacitor in the integration of Buck converters by* **Jorge Cortés**, International Conference on Integrated Power Electronics Systems **(CIPS)**, February, Nuremberg (Germany)
- **Student Travel Grant of IEEE,** *Low-Cost Radar-Based Target Identification Prototype using an Expert System by* **David Pérez & Mónica Villaverde**, International Conference on Industrial Informatics (INDIN), July, Porto Alegre (Brazil)
- **Best Paper,** *Power Converter Topologies for a High Performance Transformer Rectifier Unit in Aircraft by* **José Luiz Vieira, Jesús A. Oliver, Pedro Alou & José A. Cobos**, International Conference on Industry Applications (INDUSCON) & Conferência Panamericana de Iluminaçao (LUX AMERICA), December, Juiz de Fora (Brazil)


J.L. Vieira

- ***Best poster award,*** *Optimization and analysis of PwrSoC Buck converter with integrated passives for automotive application* by **Vladimir Šviković, IEEE Energy Conversion Congress and Exposition (ECCE),** September, Pittsburgh, PA (USA)
- ***Best poster award*** *, Comparison of the behavior of voltage mode, V2 and V2Ic control of a buck converter for a very fast and robust dynamic response by* **Jorge Cortés, IEEE Applied Power Electronics Conference and Exposition (APEC),** March, Fort Worth, TX (USA)
- ***Best poster award,*** *Design of Energy Control Method for Three-Phase Buck-Type Rectifier with Very Demanding Load Steps* by **Sisi Zhao, IEEE Applied Power Electronics Conference and Exposition (APEC),** March, Fort Worth, TX (USA)


Christmas party at CEI

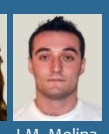
OUTGOING VISITING researchers in 2014

- **David Aledo,** doctoral student, stayed at Dept. of Electronic and Information Engineering (EIE) of Hong Kong Polytechnic University (China) since 1/5/2014 until 31/7/2014
- **Eduardo de la Torre,** stayed as an invited professor at Lab-STICC, Université de Bretagne-Sud in Lorient (Brittany, France) since 27/6/2014 until 27/7/2014.
- **Dejana Čučak,** doctoral student, stayed at Center for Power Electronics and Systems (CPES) at Virginia Tech. in Blacksburg (Virginia, USA) since 1/7/2014 until 31/9/2014
- **José M. Molina,** doctoral student, stayed at DEI at University of Padova (Italy) since 30/6/2014 until 6/10/2014


D. Aledo


E. de la Torre


D. Čučak


J.M. Molina

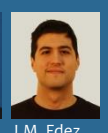
INCOMING VISITING researchers in 2014

- **Xinyue Kan** from Beijing University of Posts &Telecommunications, Beijing (China)
- **Pei Xiaqing** from Beihang University, Beijing (China)
- **Andreas Berger** from Infineon Villach (Austria)
- **José Luiz de Freitas Vieira** professor at Universidade Federal do Espírito Santo (Vitória, Espírito Santo, Brasil) since 5/3/2014 until 25/2/2015.

WELCOME...

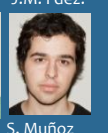
to new members who have joined CEI-UPM during this period: **José M. Fernández, Fátima Hernández, Mª Regina Ramos, Santiago Muñoz, Alejandro Dionisio** from UPM (Spain)**, Khalifa Bellazi** from The Higher Institute of Industry (Tripoli, Libia) and **Galo Guarderas** from Escuela Politécnica del Ejército (Quito, Ecuador) as full-time researchers and Master students.


K. Bellazi


J.M. Fdez.


G. Guardera


F. Hdez.


S. Muñoz

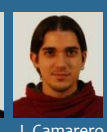

R. Ramos

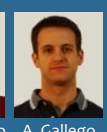
FAREWELL...

to **Andrés Otero** who joined Televés (Spain), **Blanca López at** IBM (Spain), **Mª Victoria Maigler** at BioD (Spain), **Ángel Gallego** & **Julio Camarero** at INDRA (Spain), **David Meneses** at INFINEON (Austria). **Álvaro Hernández** (Mexico), **Carlos A. López** (Mexico), **Daniel Martel** and **Javier Torres .**

Danping He (from China, now in Huawei China), **Wei He** (from China, now in Nanyang Technical Univ. of Singapore), **Peming Cheng** (from China, now in Samsung China).


P. Cheng


J. Camarero


A. Gallego

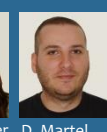

A. Hdez.

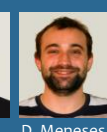

D. He


W. He


C.A. López


M.V. Maigler


D. Martel


D. Meneses


A. Otero

Books

- J. Valverde, J. Portilla, E.de la Torre, **FPGA-Based High Performance Wireless Sensor Node**, Lampbert Academic Publishing, ISBN 978-0-08-096532-1
- A. Rodríguez, F. Moreno, ***Hardware-Based Particle Filter with Evolutionary Resampling Stage***, Lampbert Academic Publishing, ISBN 978-3-659-61299-2

Book Chapter

- J Portilla, A Otero, V Rosello, J Valverde, YE Krasteva, E de la Torre, and T Riesgo, *Comprehensive Materials Processing*, ***Wireless Sensor Networks: From Real World to System Integration – Alternative Hardware Approaches***, Elsevier, ISBN 978-3-659-61665-5

Journals

- **P. Cheng, M. Vasic , O. García , J.A. Oliver , P. Alou , J.A. Cobos,** *Minimum Time Control for Multiphase Buck Converter: Analysis and Application,* **IEEE Transactions on Power Electronics,** February
- **D. Diaz, O. García , J.A. Oliver , P. Alou , Pavlovic, Z., J.A. Cobos,** *The Ripple Cancellation Technique Applied to a Synchronous Buck Converter to Achieve a Very High Bandwidth and Very High Efficiency Envelope Amplifier,* **IEEE Transactions on Power Electronics,** June
- **M. Vasić, O. García,P. Alou, J.A. Oliver, J.A. Cobos,** *Theoretical Efficiency Limits of a Serial and Parallel Linear-Assisted Switching Converter as an Envelope Amplifier,* **IEEE Transactions on Power Electronics,** February
- **V. Svikovic, J. Cortes, P. Alou, J.A. Oliver, O. Garcia, J.A. Cobos,** *Multiphase Current Controlled Buck Converter with Energy Recycling Output Impedance Correction Circuit (OICC),* **IEEE Transactions on Power Electronics,** December
- **D. Meneses, O. Garcia, P. Alou, J.A. Oliver, J.A. Cobos,** *Grid-connected Forward Micro-inverter with Primary-Parallel Secondary-Series Transformer,* **IEEE Transactions on Power Electronics,** December
- **S. Bhasin, W.He, S. Guilley, J.L. Danger,** *Exploiting FPGA Block Memories for Protected Cryptographic Implementations,* **ACM Transactions on Reconfigurable Technology and Systems,**
- **I.F. Kovacvevic, J.W. Kolar, S.D. Round, M. Vasic,** *Mission Profile Based Optimization of a Wearable Power System,* **EPE Journal,** September
- **W.He, S.Bhasin, A.Otero, T.Graba, E.de la Torre, J.-L.Danger,** *Sophisticated Security Verification on Routing Repaired BCDL Dual-Rail Logic against Side Channel Analysis,* **IET Information Security,**
- **D. He, G. Mujica, J. Portilla, T. Riesgo,** *Modelling and planning reliable wireless sensor networks based on multi-objective optimization genetic algorithm with changeable length,* **Journal of Heuristics,** August
- **D. He, G. Mujica, G. Liang, J. Portilla, T. Riesgo,** *Radio propagation modeling and real test of ZigBee based indoor wireless sensor networks,* **Journal of Systems Architecture,** August
- **W. He, A. Otero, E. de la Torre, T. Riesgo,** *Customized and Automated Routing Repair Toolset towards Side-Channel Analysis Resistant Dual Rail Logic,* **Microprocessors and Microsystems,**
- **L. F. Beites, M. Alvarez, A. Díaz,** *Sensor optimum location algorithm for estimating harmonic sources injection in electrical networks,* **Renewable Energy and Power Quality Journal (RE&PQJ),** April
- **J. Cortes, V. Šviković, P. Alou, J.A. Oliver, J.A. Cobos, R. Wisniewski ,** *Accurate analysis of sub-harmonic oscillations of v2 and v2ic and controls applied to Buck Converter,* **IEEE Transactions on Power Electronics**, vol. PP, no.99, pp.1,1
- **J. Cortes, V. Šviković, P. Alou, J.A. Oliver, J.A. Cobos,** *Improved transient response of controllers by synchronizing the modulator with the load step: application to v2ic,* ***IEEE Transactions on Power Electronics***, vol. PP, no.99, pp.1,1
- **J. Cortes, V. Šviković, P. Alou, J.A. Oliver, J.A. Cobos**, *v1 concept: designing a voltage mode control as current mode with near time-optimal response for Buck-type converters,* ***IEEE Transactions on Power Electronics***, vol. PP, no.99, pp.1,1
- **J. Uceda,** *De lo local a lo global: la internacionalización de las Universidades en España,* **Nueva Revista** de Política, Cultura y Arte, nº 151m, pp.. 302-314

Editorial Boards

- **P. Athanas, R. Cumplido, E. de la Torre**, *Introduction to the special issue on FPGA Technology and Applications,* **Computers and Electrical Engineering**
- **E. de la Torre, C. Jego, P. Meloni, S. Pillement**, *Design and Architectures for Signal and Image Processing,* **EURASIP Journal on AAdvances in Signal Processing**
- **P. Athanas, R. Cumplido, C. Feregrino, E. de la Torre**, *Introduction to Special issue on FPGA Devices and Applications,* **Microprocessors and microsystems (MICPRO)**

Conferences

IEEE Applied Power Electronics Conference and Exposition (APEC), March, Fort Worth, TX, USA

- S. Zhao, J. M. Molina, M. Silva, J. A. Oliver, P. Alou, J. Torres, F. Arévalo, O. Garcia, J. A. Cobos, *Design of Energy Control Method for Three-Phase Buck-Type Rectifier with Very Demanding Load Steps*
- J. Cortes, V. Svikovic, P. Alou , J.A. Oliver , J.A. Cobos, *Comparison of the behavior of voltage mode, V2 and V2Ic control of a buck converter for a very fast and robust dynamic response*
- D. Meneses, O. García , P. Alou , J.A. Oliver , R. Prieto , J.A. Cobos, *Forward micro-inverter with primary-parallel secondary-series multicore transformer*
- M. Silva, N. Hensgens, J.A. Oliver, P. Alou , O. García , J.A. Cobos, *Isolated Swiss-Forward three-phase rectifier for aircraft applications*
- J.M. Molina, S. Zhao, M. Silva, J.A. Oliver , P. Alou , J. Torres, F. Arevalo, F., O. García , J.A. Cobos, *Power distribution in a 13 kW three-phase rectifier system: Impact on weight, volume and efficiency*
- F. Holguin, R. Prieto ,R. Asensi, J.A. Cobos, *Power losses calculations in windings of gapped magnetic components*
- F. Holguín., R. Asensi, R. Prieto , J.A. Cobos, *Simple analytical approach for the calculation of winding resistance in gapped magnetic components*

Workshop on Control and Modeling for Power Electronics (COMPEL), June, Santander (Spain)

- J. Cortes, V. Svikovic, P. Alou , J.A. Oliver , J.A. Cobos, *An optimization algorithm to design fast and robust analog controls for Buck converters*
- V. Svikovic, J. Cortes, P. Alou , J.A. Oliver, J.A. Cobos , Maderbacher, G., Sandner, C., *Energy-Based switches losses model for the optimization of PwrSoC buck converter*

NASA/ESA Conference on Adaptive Hardware and Systems (AHS), July, Leicester (United Kingdom)

- F. Veljković, T. Riesgo, L. Berrojo, R. Regada, Á. Álvaro, E. de la Torre, *A run time adaptive architecture to trade-off performance for fault tolerance applied to a DVB on-board processor*
- B. López, J. Valverde, E. de la Torre, T. Riesgo, *Power-aware multi-objective evolvable hardware system on an FPGA*

European Conference on Power Electronics and Applications (EPE'14-ECCE Europe), August, Lappeeranta (Finland)

- J. Cortes, V. Svikovic, P. Alou , J.A. Oliver , J.A. Cobos, *Analysis of the effect of modulation delays on the size of the output capacitor*
- M. Jimenez, J. Cortes, A.Benchaib, P. Alou , G. Damm, J.A. Cobos , F. Lamnabhi-Lagarrigue, *DC / DC converters as DC circuit-breakers in HVDC networks operation*

IEEE Energy Conversion Congress and Exposition (ECCE), September, Pittsburgh, PA (USA)

- D. Meneses, O. García , P. Alou , J.A. Oliver , J.A. Cobos, *Multiphase parallel interleaved and primary-parallel secondary-series forward micro-inverter comparison*
- V. Svikovic , J. Cortes, P. Alou , J.A. Oliver, J.A. Cobos, *Optimization and analysis of PwrSoC Buck converter with integrated passives for automotive application*
- D. Cucak , M. Vasic , O. García , Bouvier, Y., J.A. Oliver, P. Alou , J.A. Cobos , Wang, A., Martin-Horcajo, S., Romero, F., Calle, F., *Physical modeling and optimization of a GaN HEMT design with a field plate structure for high frequency application*

Design & Architectures for Signal & Image Processing (DASIP), October, Madrid (Spain)

- J. Mora, a. Gallego, A. Otero, E. de la Torre, T. Riesgo, *Increased fault tolerance in evolvable hardware through automatic upscaling*
- B. López, J. Mora, P. Mansanet, E. de la Torre, T. Riesgo, *Development of Brain-Computer Interfaces using evolvable hardware*
- J. Valverde, A. Rodríguez, J. Mora, C. Castañares, J. Portilla, E.de la Torre, T. Riesgo , *A Dynamically Adaptable Image Processing Application Trading Off Between High Performance, Consumption and Dependability in Real Time*

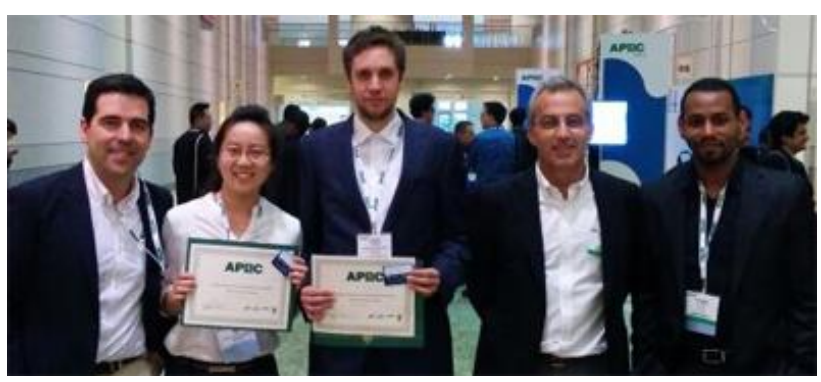
Conference on Design of Circuits and Integrated Systems (DCIS), November, Madrid (Spain)

- G. Mujica, R. Zamacola, J. Portilla, T. Riesgo, *Performance Evaluation of an AODV-Based Routing Protocol Implementation by Using a Novel In-Field WSN Diagnosis Tool*
- F.J. Vazquez, B. Lopez, J. Valverde, E. de La Torre, T. Riesgo, *Collaborative Evolution Strategies on Evolvable Hardware Networked Elements*
- E. Quesada, Mª V. Maigler, A. Barbado, J. Valverde, J. Portilla, T. Riesgo , *Environmental Wireless Sensor Network Deployment in Food Industry: from Theory to Practice*

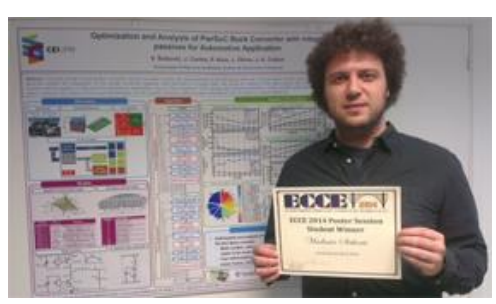
Other

- J. Cortés, V. Svikovic, P. Alou, J.A. Oliver, J.A. Cobos, *Impact of the control on the size of the output capacitor in the integration of Buck converters,* **International Conference on Integrated Power Electronics Systems (CIPS),** February, Nuremberg (Germany)
- L.F. Beites, M. Alvarez, A.Díaz, *Sensor optimum location algorithm for estimating harmonic sources injection in electrical networks,* **International Conference on Renewable Energies and Power Quality (ICREPQ),** April, Cordoba (Spain)
- C. Tu, W. He, N. Gao, E. de la Torre, Z. Liu, L. Liu, *A Progressive Dual-Rail Routing Repair Approach for FPGA Implementation of Crypto Algorithm,* **Information Security Practice & Experience Conference (ISPEC),** May, FuZhou (China)
- A. Rodriguez, J. Valverde, E. de la Torre, T. Riesgo, *Dynamic management of multikernel multithread accelerators using Dynamic Partial Reconfiguration,* **International Symposium on Reconfigurable and Communication-Centric Systems-on-Chip (ReCoSoC),** May, Montpellier (France)
- F. Veljković, T. Riesgo, L. Berrojo, R. Regada, Á. Álvaro, E. de la Torre, *Analysis of Design Alternatives on using Dynamic and Partial Reconfiguration in a Space Application,* **Data Systems in Aerospace - DASIA 2014,** June, Varsovia (Polonia)
- Y. Bouvier, M Vasic, P. Alou, J. A. Oliver, O. García, J. A. Cobos, *45kW Full Bridge Converter with Discontinuous Primary Current for High Efficiency Airborne Application,* **Seminario Anual de Automática, Electrónica Industrial e Instrumentación (SAAEI),** June, Tanger (Morocco)
- D.P. Daza, M. Villaverde, F. Moreno, Noemí Nogar, F. Ezcurra y Ekaitz Aznar, *Low-Cost Radar-Based Target Identification Prototype using an Expert System,* **International Conference on Industrial Informatics (INDIN),** July, Porto Alegre (Brazil)
- J. Valverde, A. Rodriguez, J. Camarero, J. Portilla, E. de la Torre, T. Riesgo , *A dynamically adaptable bus architecture for trading-off among performance, consumption and dependability in Cyber-Physical Systems,* **International Conference on Field Programmable Logic and Applications (FPL),** September, Munich (Germany)
- G. Mujica, J. Portilla, T. Riesgo, *Testbed Infrastructure for Debugging, Analyzing and Optimizing WSN Nodes Based on a Modular HW-SW Architecture,* **V Jornadas de Computación Empotrada (JCE). SARTECO ,** September, Valladolid (Spain)
- D. Cucak , M. Vasic , O. García , Y. Bouvier, J.A. Oliver, P. Alou , J.A. Cobos , A. Wang, S. Martin-Horcajo, F. Romero, F. Calle., *Physical model for GaN HEMT design optimization in high frequency switching applications,* **European Solid State Device Research Conference (ESSDERC),** September, Venice (Italy)
- M. Villaverde, D.P. Daza & F. Moreno, *Cooperative Learning Model based on Multi-Agent Architecture for Embedded Intelligent Systems,* **Annual Conf. IEEE Industrial Electronics Society (IECON),** Oct, Dallas (USA)
- J.L. Vieira, J.A. Oliver, P. Alou, J.A. Cobos, *Power Converter Topologies for a High Performance Transformer Rectifier Unit in Aircraft,* **International Conference on Industry Applications (INDUSCON) & Conferência Panamericana Iluminaçao (LUX AMERICA),** December, Juiz de Fora (Brazil)

D.P. Daza, *Student Travel Grant*



S. Zhao & J. Cortés, *Best poster Award, with J.A. Oliver, J.A. Cobos and F. Holguín (left-right)*



V. Šviković, *Best poster Award*